

June 28, 2010
9L-22-N410-ST-126

Dennis J. McLerran
Regional Administrator
US EPA Region 10
1200 Sixth Avenue, Suite 900
Seattle WA 98108-3140



Re: Submittal of Work Plan for Concrete Joint Removal under TSCA Self-Implementing Rules of 40 C.F.R § 761.61, North Boeing Field, Seattle, Washington

Dear Mr. McLerran,

Enclosed is a work plan for removal of PCB containing concrete joint material at the North Boeing Field Site. This work plan was prepared in accordance with the provisions of the self-implementing procedure for the cleanup and disposal of PCB remediation waste under 40 C.F.R § 761.61. Certification forms signed by Boeing, the City of Seattle and King County, specifying the location of the plans and procedures are included as separate enclosures.

Boeing is planning to begin this removal work during the first week of August. If you have any questions regarding this work, please contact Carl Bach at 206-898-0438 or carl.m.bach@boeing.com.

Sincerely,

A handwritten signature in black ink, appearing to read "St. Tochko".

Steven Tochko
Manager, Environmental Remediation

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cc: Scott Downey, EPA
Mark Edens, Department of Ecology
Peter Dumaliang, King County Airport
Jennie Goldberg, City of Seattle

CERTIFICATION FOR SELF-IMPLEMENTING CLEANUP OF PCB REMEDIATION WASTE

PARTY CONDUCTING THE CLEANUP

The Boeing Company

I certify that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize the PCB contamination at the cleanup site for the Concrete Joint Removal, North Boeing Field, Seattle, WA are on file at The Boeing Company Plant 2 and are available for EPA inspection. I also certify that a copy of all of the above will be provided to the property owners, King County and the City of Seattle, promptly after receipt by Boeing.

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Date: 2010.06.10 14:42:21 -0700

Name (printed or typed): Carl M. Bach Date: 06 / 10 / 2010

PROPERTY OWNER

King County

I certify that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize the PCB contamination at the cleanup site for the Concrete Joint Removal, North Boeing Field, Seattle, WA that have been provided to King County by Boeing are on file at KCIA Engineering and are available for EPA inspection. Based on representations by Boeing, the County understands that the copies provided by Boeing are complete and include all of the documents required to be made available for EPA inspection. However, the County is not certifying that the copies received from Boeing are, in fact, complete. In addition, the County is not certifying to the quality of the documents. In particular, the County is not certifying that the documents were properly prepared or were adequate.

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Name (printed or typed) Peter Dumaliang Date: 6/22/10

PROPERTY OWNER

City of Seattle

I certify that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize the PCB contamination at the cleanup site for the Concrete Joint Removal, Seattle, WA that have been provided to the City of Seattle by Boeing are on file at Seattle City Light's Environmental Affairs Division and are available for EPA inspection. Based on representations by Boeing, the City understands that the copies provided by Boeing are complete and include all of the documents required to be made available for EPA inspection. However, the City is not certifying that the copies received from Boeing are, in fact, complete. In addition, the City is not certifying to the quality of the documents. In particular, the City is not certifying that the documents were properly prepared or were adequate.

Name: (Last) Goldberg (First) Jennie (MI) S

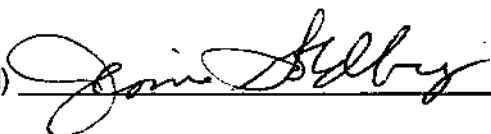
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**Work Plan
Concrete Joint Removal
North Boeing Field
Seattle, Washington**

June 29, 2010

Prepared for

The Boeing Company



**LANDAU
ASSOCIATES**

130 2nd Avenue South
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APPENDICES

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A	Health and Safety Plan

1.0 INTRODUCTION

This document presents a work plan for removal of concrete expansion joint material (also referred to as caulk) at North Boeing Field (NBF) located in Seattle, Washington (Figure 1). Previous investigations have identified 11 different types of material filling the concrete expansion joints at NBF. Each of these types of material has been shown to contain polychlorinated biphenyls (PCBs); however, some tend to contain higher concentrations than others. This work plan describes the methods to be employed in an interim action for removal of PCB-containing concrete joint material (CJM).

Rather than focusing on specific types of CJM with elevated PCB concentrations, this interim action focuses on the Propulsion Engineering Labs (PEL) area of NBF where samples of suspended storm drain solids continue to show elevated concentrations of PCBs. To the extent practicable, all CJM will be removed from the PEL area of the North Lateral drainage basin (Figure 2) unless the CJM and adjacent concrete can be documented to have been installed after 1980. CJM will be removed from the PEL area regardless of PCB concentration; therefore, no additional pre-removal sampling will be conducted to characterize concentrations in the interim action removal area. This work plan may also be used for removal of CJM or other caulk material within the confines of the NBF site, if such removal is necessary.

PCB concentrations in joint compounds in the PEL area are not known to exceed 50 milligrams per kilogram (mg/kg); however, this work plan assumes that some caulk containing PCBs greater than or equal to 50 mg/kg may be encountered during the removal process. Therefore, the removal and disposal of all CJM described in this work plan will be conducted in accordance with the Toxics Substances Control Act (TSCA) under the requirements of the self-implementing procedure for the cleanup and disposal of PCB remediation waste [40 C.F.R. § 761.61 (a)]. Characterization sampling and confirmation sampling will not be performed prior to or following removal and disposal of CJM. All CJM material in the North Lateral is planned to be removed and disposed of under the self-implementing guidelines of TSCA; therefore, there will be no material remaining from which to collect samples.

This work plan provides background information regarding investigations and CJM removal actions conducted to date (Section 2.0), a description of the procedures to be used for removal of CJM (Section 3.0), and a plan to address the health and safety of personnel supporting the CJM activities (Section 4.0).

2.0 BACKGROUND

In 2001, several investigations of CJM at NBF were conducted. These investigations consisted of a visual inspection of the CJM, sampling and analysis of the materials, and mapping of the location of CJM types shown to contain PCBs. Results of these investigations are documented in the following reports: *Sampling and Analysis Report, Concrete Joint Material, North Boeing Field, Seattle, Washington* (Landau Associates 2001a); *Concrete Expansion Joint Material Field Mapping Report, North Boeing Field, Seattle, Washington* (Landau Associates 2001b); and *April 2001 Sampling Investigation Draft Report, Concrete Expansion Joint Material, North Boeing Field, Seattle, Washington* (Landau Associates 2001c).

During these investigations, CJM with similar characteristics (e.g., color, consistency, texture, sheen, weathering patterns, etc.) were identified as one type of material and were given an alphabetical designation from A to K. Because slight variations of certain types of CJM were observed, some subtypes were also identified and are indicated by a number following the alphabetical designation identifying the main CJM type. Also, at some locations only remnants of a CJM type were observed. The presence of remnant material is caused when CJM is replaced and a portion of the CJM being removed remains along the edges of the concrete joint. These remnants of CJM are referred to as “residual” CJM. The residual CJM may be found as discontinuous and sparse fragments of material or as strips of material along the joint surface edges. Descriptions of the 11 types of CJM are provided in Table 1.

Subsequent investigations of the CJM identified about 81,000 linear feet (ft) of primary and residual material at concentrations greater than 50 mg/kg. Approximately 89,000 linear ft of PCB-containing CJM was removed from NBF between 2002 and 2006 (Landau Associates 2007). Analysis of five samples of replacement CJM collected in December 2006 indicated concentrations of total PCBs from below reporting limits to 370 mg/kg. The general locations of each type of CJM (i.e., A through K) currently in place at NBF are shown on Figure 3. Areas from which CJM has already been removed are also designated on Figure 3.

The Washington State Department of Ecology (Ecology) has requested that Boeing remove all CJM with concentrations of PCBs exceeding 1 mg/kg “because of potential for releases of caulk [CJM] to the property and to the storm drain system” (Ecology 2010). Boeing understands that Ecology will continue to use 1 mg/kg as the remediation level for total PCBs in CJM until sufficient technical information is available to suggest a different remediation level. Boeing will continue with a two-dimensional approach to PCB-containing CJM at NBF. These two actions will simultaneously remove

significant amounts of PCB-containing CJM and evaluate the relationship between PCB concentrations in CJM and the risk of onsite and offsite exposure.

First, Boeing is proceeding with the removal of all CJM, regardless of PCB concentrations, in the area of primary concern (the PEL area of the North Lateral drainage basin). The proposed interim action for that focused CJM removal effort is contained in this work plan. The North Lateral drainage basin is the only area at NBF that has consistently exceeded the sediment quality standard for PCBs; removal of CJM from this area has the greatest potential for reducing future migration of PCB-containing CJM from NBF to Slip 4.

Second, Boeing is conducting a human health risk assessment and transport evaluation for PCB-containing CJM. The human health risk assessment will quantify expected health risks for receptors exposed to PCB-containing CJM at the NBF site. The transport evaluation will estimate concentrations of PCBs released to Slip 4 by way of CJM migration through the storm drain system. Conducted in conjunction with a sampling effort to characterize PCB concentrations in CJM at NBF, these evaluations will provide data integral to discussions regarding appropriate cleanup levels for PCBs in CJM that are protective of onsite exposure and releases to Slip 4.

3.0 JOINT MATERIAL REMOVAL ACTIVITIES AND PROCEDURES

Removal and disposal of CJM must be conducted in a manner that minimizes the releases of PCBs to the environment and allows for proper disposal of the material. Therefore, the procedures described below will be used to reduce the potential for deposition of CJM fragments on nearby paved surfaces and discharge to the stormwater drainage system. CJM removal will be conducted by Boeing personnel, or personnel contracted to Boeing who are familiar with such work and have had the health and safety training described in section 4.0.

3.1 JOINT MATERIAL REMOVAL

To the extent practicable, all CJM will be removed from the PEL area of the North Lateral drainage basin, regardless of PCB content. Although some of the CJM to be removed does not contain PCBs at detectable levels, all CJM removal activities will be conducted to minimize environmental releases. CJM removal activities will be performed utilizing various methods based on the location, access limitations, adherence of the CJM to other materials, characteristics of the CJM, and site conditions. Removal may include some or all of the following steps, but are not limited to: saw cutting, manual extraction, pressure washing, residual scraping, and cleanup.

3.1.1 STEP 1: SAW CUTTING

With the use of saw cutting, CJM will be removed from the concrete expansion joint by first cutting along each side of the joint with a concrete saw. The saw blade will be set to cut to the bottom of the existing joint and to skim the side of the joint. During cutting, the blade will be cooled and lubricated with water. Air-powered drum vacuums will be used to control and capture all of the water and slurry generated during the cutting operations.

3.1.2 STEP 2: MANUAL EXTRACTION

After both sides of the expansion joint are cut, as much material as possible will be manually extracted by hand and knife blade. Manual extraction may also be used without saw cutting. The removed material will be placed in drums and disposed as PCB-containing waste.

3.1.3 STEP 3: PRESSURE WASHING

Pressure washing may be used to remove smaller bits of CJM and may be used to clean the joint areas prior to addition of new sealant. Pressure washing with a fan tip would be used to clean the slurry

and debris out of the joint and from the top of the concrete surrounding the joint. . Drum vacuums will be used during all pressure washing operations to control and capture the wastewater.

3.1.4 STEP 4: RESIDUAL SCRAPING

Following pressure washing, the joint will be inspected for any significant amounts of remaining CJM. If significant CJM remains, the locations will be identified for further removal. A wire or diamond wheel attached to an electric hand-held grinder, walk-behind pneumatic tool, or other suitable removal tool will then be used to scrape away all of the remaining CJM.

3.1.5 STEP 5: CLEANUP

Following removal of all CJM, a pressure washer with a fan tip will be used to clean the nearby concrete surface and remove any accumulated debris from the joint prior to refilling. Drum vacuums will be used during pressure washing to control and capture the wastewater. A small street sweeper may be employed to scrub and vacuum dry surfaces around the work area when CJM is being removed.

3.2 RUNOFF CONTROL

Control measures will be implemented to capture wastewater, slurry, and debris generated during removal of CJM and to prevent CJM from entering the stormwater drainage system. The control measures to be implemented include the following:

- **Air-Powered Drum Vacuums.** These will be used during all cutting and pressure washing activities and when removal activities are performed in times of light rain.
- **Street Sweeper.** A small street sweeper may be used to scrub and vacuum dry surfaces around the work area where CJM is being removed.
- **Weather Restrictions.** To the extent possible, removal of PCB-containing CJM will not be conducted during periods of significant rain.
- **Sequencing.** To the extent possible, CJM removal will be sequenced such that work begins uphill and progresses downhill to facilitate control and capture of any wastewater, surface water, and slurry.
- **Catch Basin Filters or Other Control Devices.** Prior to removal of CJM, catch basin filters, inflatable plugs, water dams, or other containment devices will be utilized where runoff from the work area could enter storm drain systems. If wastewater does enter a catch basin during removal work, the wastewater will be removed by vacuum and the catch basin pressure washed before it is returned to normal service.

3.3 MANAGEMENT OF WASTE

All wastewater generated during removal of PCB-containing CJM and wastewater generated during decontamination activities will be contained and properly managed as though it were remediation

waste under TSCA in accordance with the self-implementing requirements in 40 C.F.R. 761.61(a). Wastewater will be collected and treated to less than 3 micrograms per liter ($\mu\text{g/L}$) PCBs using flocculants, particulate filters and/or carbon treatment vessel prior to entering the NBF Sweeper Decant Station for further treatment through solids settling and/or additional carbon filtration methods. Treated wastewater that meets the NBF Sweeper Decant Station's discharge limits, as required by Boeing's King County Industrial Waste Permit, will be discharged to the sanitary sewer. These measures conform to the TSCA regulations 40 C.F.R. § 761.50(a)(3) and 40 C.F.R. § 761.79(b)(1)(ii). A process flow diagram for solids and wastewater treatment procedures (for TSCA and non-TSCA regulated material) is provided on Figure 4. Alternatively, wastewater may be processed in a temporary treatment system, meeting the requirements for discharge as described above. No treated wastewater will be discharged to the Lower Duwamish Waterway.

All solid waste containing PCBs greater than 50 mg/kg will be contained in drums, cubic yard boxes, or lined roll-off boxes and disposed of at the Waste Management NW landfill in Arlington, Oregon, a chemical waste landfill permitted under 40 C.F.R. § 761.75 to accept TSCA waste. All solid waste known to contain PCBs less than 50 mg/kg will be managed in accordance with Chapter 173-303 WAC.

3.4 DECONTAMINATION

Non-disposable and nonporous equipment such as concrete saws, pressure washers, drum vacuums, street sweepers, and small tools that come into contact with CJM will be decontaminated after each use. Decontamination after removal of CJM containing PCBs greater than or equal to 50 mg/kg will be performed using pressure washing, steam cleaning or hand-wiping with an appropriate solvent in accordance with the decontamination procedures required under 40 C.F.R. § 761.79, or will be discarded as contaminated TSCA-waste and placed in a roll-off box to be disposed of at a Subtitle C chemical waste landfill permitted to accept TSCA waste under 40 C.F.R. § 761.75. Only parts of the equipment that are reasonably likely to have been in contact with PCB-containing materials will be decontaminated. All wastewater generated during decontamination will be collected and treated as described in Section 3.3 above.

4.0 HEALTH AND SAFETY

A project health and safety plan (HASP) for implementation during removal of CJM is provided in Appendix A. All personnel performing the work will follow the procedures described in this HASP or follow procedures in a HASP that is at least as protective as this plan.

5.0 REPORTING

Landau Associates will prepare a cleanup report documenting the implementation of this work plan. The cleanup report will include the dates during which CJM removal was conducted, footage of CJM removed, a description of the locations where CJM was removed, and figures showing CJM removal areas. The cleanup report will include the information required under 40 C.F.R. § 761.61(a)(9) and 40 C.F.R § 761.125(c)(5).

6.0 SCHEDULE

The CJM removal described in this work plan is currently anticipated to be started shortly after approval by Ecology and the U.S. Environmental Protection Agency (EPA). CJM removal activities are expected to begin in August 2010 and continue for about 2 months depending on weather conditions. Although Boeing plans to remove all CJM in the PEL during 2010, the actual area in which CJM is removed in 2010 may vary from that planned, depending on when the work plan is approved by Ecology and EPA, weather, and site conditions.

* * * * *

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.



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Principal



Charles P. Halbert, P.E.
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KJH/CPH/tam

7.0 REFERENCES

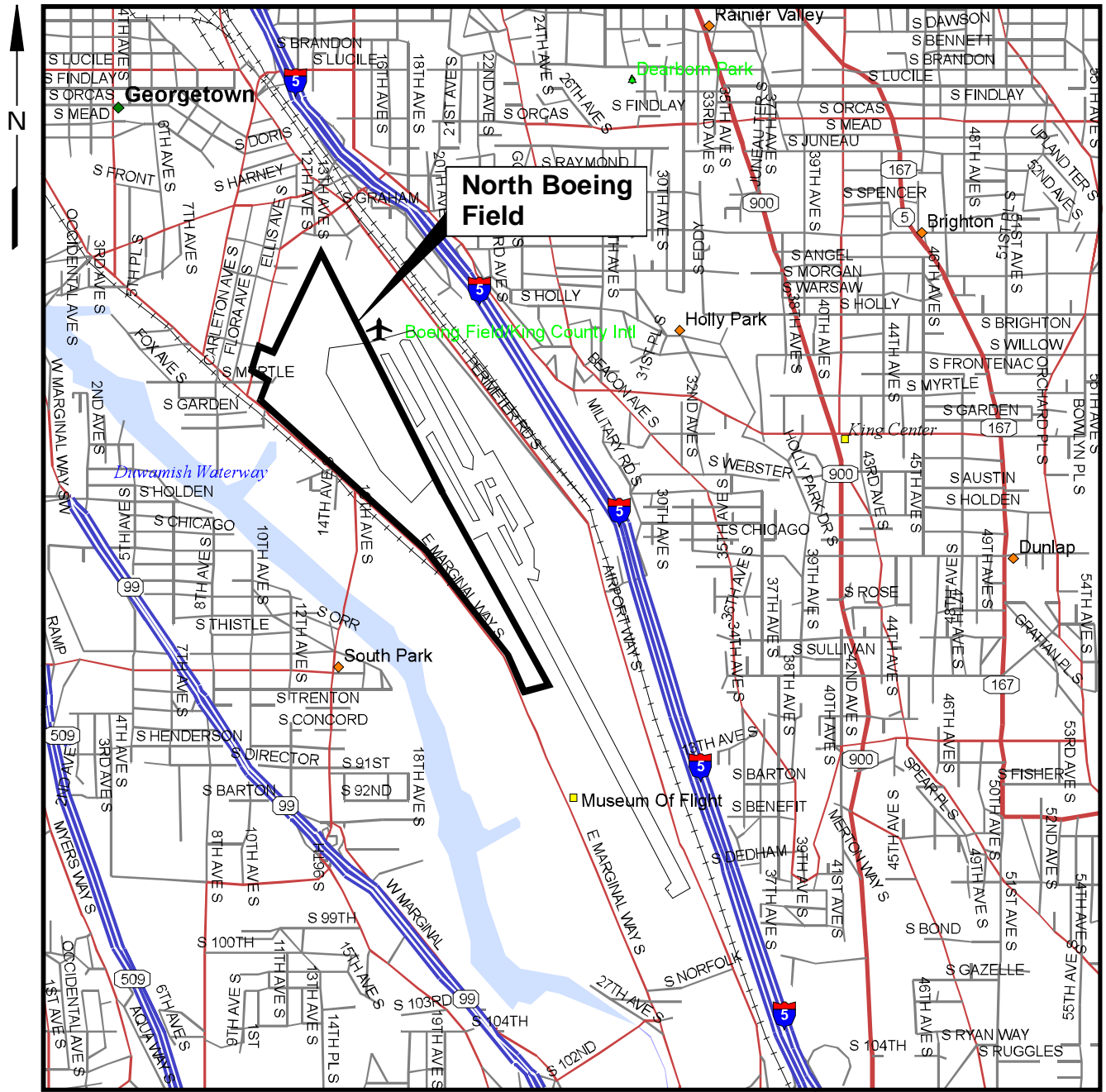
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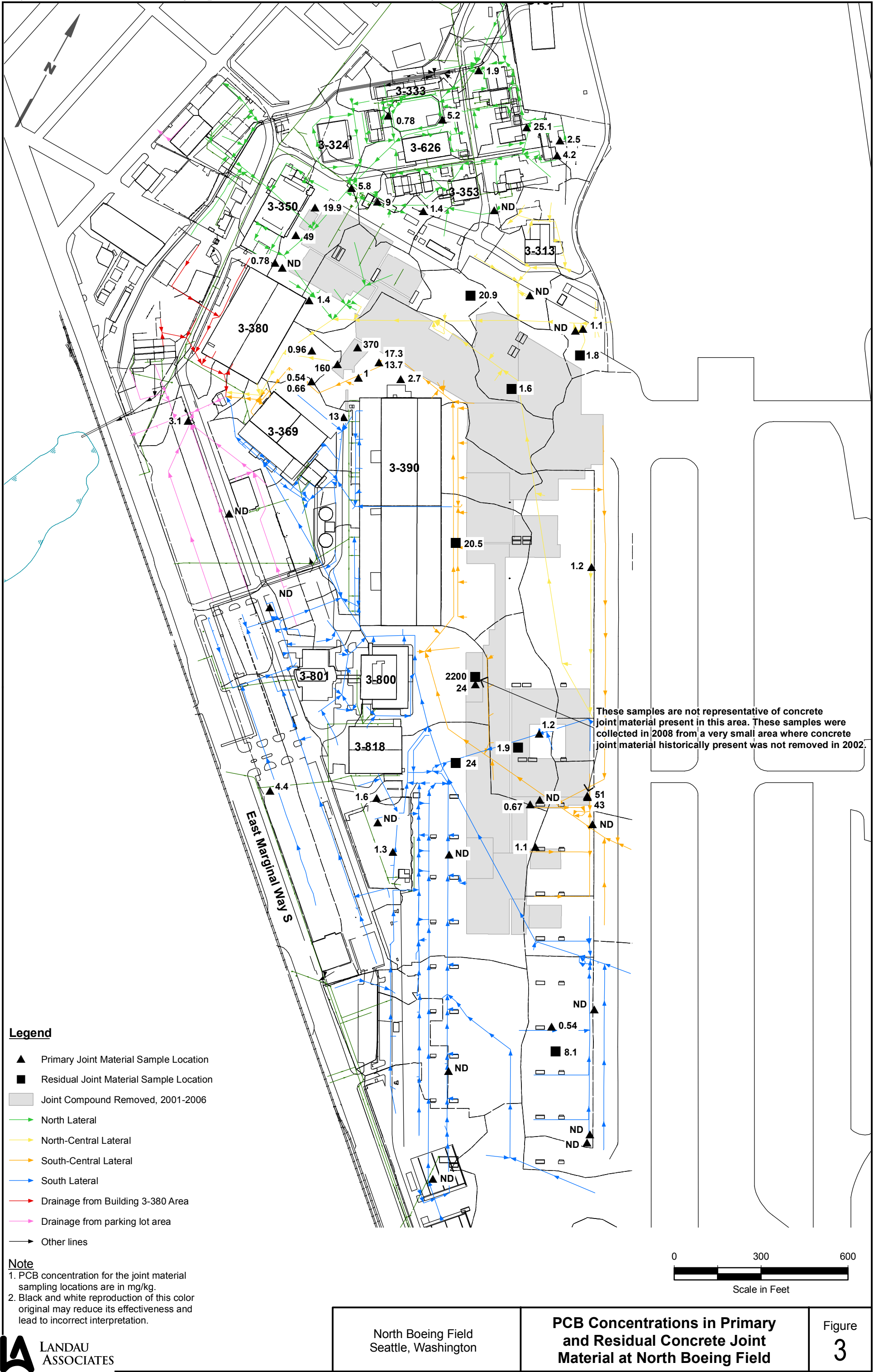
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Map from DeLorme Street Atlas USA, 2002







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TABLE 1
CONCRETE JOINT MATERIAL TYPE DESCRIPTIONS

TYPE	DATE INSTALLED	DESCRIPTION
A	Unknown	Black material with the consistency of a pencil eraser. Typically, the surface weathers with small cracks and wrinkles to a dull appearance. A freshly cut surface was slightly tacky with a shiny black appearance. The edges of the material do not bond tightly to the concrete giving a puffed-up appearance. This material was not generally associated with a backer rod.
B	Unknown	A dark brown to black material with the consistency of a soft earplug. Typically, the surface weathers slightly to dull brown and has minimal cracking. A freshly cut surface was shiny black with a sticky texture. This material was usually in good condition with the edges tightly bonded to the concrete. Type B was usually associated with joints that have been replaced by cutting out the old material. Typically, this material was placed over a gray or green-yellow rounded foam backer rod. The backer rod was stained a bronze color where it contacted with the Type B material.
B1	2000	This material is as described above with the following exception: The weathered surface was a glossy black to dark-brown. New material tended to be glossier. The minimal surface cracking had little to no depth.
B2	1997	This material is as described above, but no backer rod was associated with this joint compound in new concrete at Concourse C.
C	Unknown	A medium gray material with a consistency slightly harder than a foam earplug ranging to hardened caulking material. Typically, the surface is a dull medium gray color with minimal shallow surface cracking. A freshly cut surface is also flat. This material is usually in good condition and has been observed around the edges of newer concrete such as concrete sections that have been replaced in otherwise older areas. This material was not generally associated with a backer rod. This material has air bubbles or voids < 1-2mm in size.
C1	Unknown	A medium gray material with the consistency of bathtub caulk. Typically, the weathered surface is dull. A freshly cut surface is dull medium gray, although darker than the weathered surface. This material was found as residual material along the concrete edges. This material has pin-prick sized air bubbles.
D	Unknown	A dark brown material with the consistency of a fan belt. Typically, the weathered surface is dull with minimal surface cracking. A freshly cut surface is shiny black. This material is usually in good condition, but the edges do not seem to be tightly bonded to the concrete. This material was not generally associated with a backer rod.
D1	Unknown	This material is the same as described above with the following exceptions: A freshly cut surface is a dull black. The edges of the material are tightly bonded to the concrete. This material is usually associated with crack repairs.
E	Unknown	A light gray material with the consistency of bathtub caulk. Typically, the surface weathers to a dull white-gray. A freshly cut surface is dull light gray with trace amounts of tiny air bubbles. This material is in poor condition and is associated with joints that have been replaced around grates and utilities. Typically, this material leaves a residual white powder when rubbed. This material was not generally associated with a backer rod.

TABLE 1
CONCRETE JOINT MATERIAL TYPE DESCRIPTIONS

TYPE	DATE INSTALLED	DESCRIPTION
F	Unknown	A black tar-like material with the consistency of a pliable elastic foam earplug. Typically, the surface weathers to a dull black with a cracked and wrinkled surface, or a cracked glassy surface. A freshly cut surface is shiny, black, and slightly tacky. This material was usually in good condition. This material was not generally associated with a backer rod.
G	Unknown	A pink-tan material with the consistency of dense caulking. Typically, the surface weathers to a dull pink-tan, with irregular cracks. A freshly cut surface is a dull light tan. This material does not bond tightly to the concrete edges. Occasionally, this material has a gray-white weathered surface that can be rubbed away to show the pink-tan weathered coloring. This material was not generally associated with a backer rod.
H	Unknown	A black tar-like material with a rock-like consistency. Typically, the surface weathers to a dull black with deep cracking and wrinkling. This brittle material does not cut, but, instead, fractures. A freshly fractured surface is a glassy black with irregular edges. This material is usually in poor condition, with edges not tightly bonded to the concrete. This material was not generally associated with a backer rod.
I	Unknown	A dull brown-gray material with the consistency and density of a rubber bungee cord. Typically, the surface weathers with slight wrinkles. A freshly cut surface is a dull brown-gray. This material is usually in good condition. The material is well bonded to the edges of the concrete. This material was not generally associated with a backer rod. The material characteristics suggest it may be an intermediate type between Type B and Type D.
J	Unknown	A two layer material with dark gray to black material approximately 1/8 th -inch thick over a dull tan material with the consistency of a pencil eraser. Typically, the surface weathers to a dull slightly weathered dark gray. This material is associated with new concrete installed around the oil-water separator at Concourse A. This material was associated with a gray foam backer rod.

Health and Safety Plan

**Health and Safety Plan
Concrete Joint Removal
North Boeing Field
Seattle, Washington**

June 28, 2010

Prepared for

The Boeing Company



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FORMS

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A-1	Acknowledgment
A-2	Modification to Health and Safety Plan
A-3	Employee Exposure/Injury Incident Report

TABLES

<u>Table</u>	<u>Title</u>
A-1	Emergency Services

1.0 INTRODUCTION

This health and safety plan (HASP) presents the protocols that will be required to provide for worker health and safety during removal of concrete joint material (CJM) containing polychlorinated biphenyls (PCBs), which fills (or is present along the edges of) some of the concrete expansion joints at North Boeing Field (NBF) in Seattle, Washington. Activities associated with removal of this material include: saw cutting, removal of joint material, pressure washing, scraping/grinding, and cleanup. This HASP presents the project health and safety organization, safety rules and procedures, potential site hazards, description of levels of personal protection and required equipment, emergency response information, training requirements, and requirements for routine health care and health monitoring. This HASP is based on the most current knowledge of site conditions.

This HASP complies with, but does not replace, Washington State Health and Safety Regulations as set forth in WAC 296-62 Part P. Requirements outlined in this HASP are considered the minimum health and safety requirements for PCB-containing CJM. All joint removal work will be performed in accordance with this HASP and the Occupational Safety and Health Administration (OSHA) Standard 29 C.F.R. 1910.120, which regulates hazardous waste site operations.

2.0 HEALTH AND SAFETY PLAN APPLICABILITY AND ADHERENCE

Individuals performing activities associated with removal of CJM at NBF must read, understand, and comply with this HASP prior to undertaking joint removal activities. If any information presented in this HASP is unclear, the reader should contact the Boeing Site Safety Officer for clarification prior to participating in any site activity. After the information has been read and understood, the individual must sign the Acknowledgment (Form A-1), which will then be placed in the project file.

This HASP is flexible and allows unanticipated site-specific problems to be addressed, while providing adequate and suitable worker protection. This HASP may be modified at any time, based on the judgment of the respective Site Safety Officer or the Project Safety Officer, as appropriate. The Site Safety Officer may make minor changes to this HASP regarding day-to-day activities (e.g., location of decontamination station, etc.). Substantive changes to procedures [e.g., downgrade of level of personal protective equipment (PPE)] must receive the concurrence of both the Site Safety Officer and the Project Safety Officer. Any modifications to this HASP will be documented using Form A-2 (Modification to Health and Safety Plan) and will be presented to the project site team during a safety briefing.

Activities conducted as part of this investigation will be conducted without creating health and safety risks for nearby workers or the public. All onsite personnel will be attentive to the potential for release of contaminated materials associated with site activities and will immediately bring all such matters to the attention of the appropriate Site Safety Officer. Decontamination procedures and other elements of the site procedures (e.g., access to/from work areas by heavy equipment) have been developed to be protective of both worker and public health and safety.

2.1 RESPONSIBLE INDIVIDUALS

Safety during the joint removal activities will be the responsibility of the Boeing Project Manager and the designated Site Safety Officer (lead for the crew). The Site Safety Officer, or designee, will be present at the site at all times during site activities related to the CJM removal interim action. The Site Safety Officer will be identified prior to initiation of site activities.

3.0 SITE ORGANIZATION AND OPERATION

Each work area will consist of an exclusion zone, a contamination reduction zone, and a support zone, as follows:

- **Exclusion Zone:** The exclusion zone will be defined as the area within 25 ft of a concrete expansion joint where CJM is being removed. Only authorized site personnel will be allowed in each exclusion zone. The initial level of protection required in the exclusion zone may be adjusted as conditions change. The limits of the exclusion zone will be clearly marked for protection of non-CJM removal personnel and the public. Levels of protection are discussed in more detail in Section 6.0.
- **Contamination Reduction Zone:** A contamination reduction zone will consist of a boot wash and an area to remove disposable PPE. Personnel in the exclusion zone will be required to wash their boots upon leaving the excursion zone. The contamination reduction zone may also be used for decontamination of joint removal equipment or a separate area may be set up for this task.
- **Support Zone:** The support zone will be outside the exclusion zone and the contamination reduction zone. All non-contaminated support equipment will be located in this area. Normal work clothes are appropriate for this zone. The location of this zone depends on factors such as accessibility, wind direction (upwind of work area), and resources (i.e., roads, shelter, utilities, etc.).

Each zone in each work area will be established on an activity-by-activity basis prior to initiation of work and will be clearly identified to all site personnel.

3.1 SITE SECURITY

CJM removal activities are expected to occur in a restricted-access industrial area. The work area will be blocked off to prevent non-trained Boeing employees from entering the exclusion zone.

4.0 SAFETY RULES AND PROCEDURES

Safety is the responsibility of every individual involved in project efforts. Whether in the office or in the site, properly followed procedures are essential for personal safety and to minimize injuries or accidents involving equipment. Potential hazards while working at the site include, but are not limited to:

- Exposure to toxic and/or hazardous chemicals
- Physical hazards from the use of concrete cutter, pressure washer, and hand tools
- Physical hazards from working conditions (e.g., heat stress, hypothermia).

4.1 SAFETY RULES

All personnel working in the site will follow the rules and procedures listed below:

- All personnel will conduct themselves in a professional manner at all times.
- No personnel will be admitted into an operational exclusion zone without safety equipment in proper working condition and requisite training.
- All personnel must comply with the established safety procedures. Anyone working onsite for or under contract with Boeing who does not comply with this HASP or other approved HASP may be immediately dismissed from the site.
- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited. Personnel should not take prescription drugs if the potential for contact with toxic substances exists, unless approved in writing by a physician.
- Firearms, ammunition, fireworks, and explosives are prohibited.
- Climbing or standing on machinery (other than service trucks) or equipment is prohibited unless authorized by the Site Safety Officer.
- Long hair must be contained inside a hard hat or tied back and tucked under clothing. Facial hair that interferes with proper operation and fit of respiratory protection gear is not allowed.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in an exclusion zone. Boeing facilities are considered tobacco free areas, no smoking or chewing is allowed on the premises.
- Disposable clothing will be used whenever necessary and appropriate to minimize the risk of cross-contamination.
- The number of personnel and the amount of equipment in contaminated areas will be minimized to allow for efficient site operations.
- Only trained and authorized personnel will perform CJM removal activities.
- Contact with contaminated or potentially contaminated material should be avoided. Efforts will be made to stage site activity upwind of removal equipment, activities, and materials if dust is present.

- Proper decontamination procedures must be followed before leaving an exclusion zone and the site, unless medical emergencies dictate otherwise (Section 4.2.1.2). All decontamination residual materials, and any other potentially contaminated materials, will be handled properly and kept onsite or at a designated secure area.
- Only approved work clothes or equipment will be allowed within the exclusion zones.
- Exchange of PPE will not be allowed.

4.2 SAFETY PROCEDURES

Site personnel are required to follow certain safety procedures when performing joint removal activities. These safety procedures are described below:

- All activities performed in the exclusion zone will be conducted at a minimum of Level D (modified) (see Section 6.0).
- Whenever possible, personnel will be stationed upwind of site activities capable of creating airborne contamination.
- If any physical discomfort is experienced (e.g., abnormalities, nausea, lightheadedness), immediately stop work, tell the other team members, and leave the area.
- If any PPE fails, immediately leave the area.

4.2.1 WORK AREA DECONTAMINATION

All personnel must be properly decontaminated before entering a support zone from an exclusion zone.

4.2.1.1 Routine Decontamination

A decontamination area will be set up in the contamination reduction zone at the border of each exclusion zone. Prior to leaving the contamination reduction zone:

- Tyvek and gloves will be removed and placed in a trash bag or other container.
- Boots will be washed as described in this work plan.

4.2.1.2 Emergency Decontamination

In case of an emergency, cross-contamination procedures will be speedily implemented, if possible. If a life-threatening injury occurs and the injured person cannot undergo decontamination procedures without incurring additional injuries or risk, he or she will be transported wrapped in plastic sheeting if time allows and if consistent with the injury. The medical facility will be: 1) informed that the injured person has not been decontaminated, and 2) given information regarding the most probable contaminants.

4.2.1.3 Equipment Decontamination

Decontamination of joint removal equipment will occur in the contamination reduction zone or another area designated for decontamination of equipment. Equipment decontamination will follow the procedures described in this work plan.

4.2.2 MANAGEMENT OF WORK-DERIVED WASTES

Equipment and materials used for decontamination or personal protection will be cleaned or collected for appropriate disposal. Non-disposable equipment will be decontaminated onsite. Disposables will be containerized. Investigation-derived wastewater will be collected and stored in accordance with this work plan.

4.2.3 HOUSEKEEPING

Work areas will be kept as clean and orderly as possible at all times. Ordinary refuse and lightly soiled disposable protective clothing will be placed in suitable rubbish bins or trash containers at the site. The storage or introduction of extraneous materials will be minimized in the exclusion zone to minimize the decontamination load and reduce possibilities for cross-contamination. Prevention of surface water runoff to the storm drain system, cleaning of the concrete surfaces, etc., will be conducted in accordance with the procedures described in this work plan.

4.2.4 VISITORS

Authorized visitors will only be allowed to observe operations from the support zone or beyond, and must obey all instructions of the Site Safety Officer and/or Boeing's representative.

5.0 POTENTIAL SITE HAZARDS, RISKS, AND PROTECTIVE MEASURES

For joint removal activities, two types of hazard categories exist. These categories are

- Chemical
- Physical.

The risks associated with each type of hazard and the protective measures to be implemented to minimize the risks are discussed below.

5.1 CHEMICAL

The chemical hazards associated with CJM removal activities consist of elevated PCB concentrations. Under existing conditions in some portions of the property, concentrations have been observed up to 370 milligrams per kilogram (mg/kg); however, historical concentrations have been detected up to 79,000 mg/kg. Because the PCBs are bound within the matrix of joint material, and wet methods will be used while saw cutting thereby reducing dust emissions, the level of contamination to be encountered during joint removal activities is not expected to represent a significant concern if the provisions of this HASP are appropriately implemented. Water will be used to minimize the amount of dust generated and the lateral migration of any airborne particles, if dust is generated.

5.1.1 RISKS

The potential risks associated with acute exposure to PCBs are irritated eyes, chloroacne, liver damage, and reproduction effect, if inhaled, ingested, or absorbed through the skin. The most conservative Washington Industrial Safety and Health Act (WISHA) time-weighted average exposure limit for skin is 0.5 milligrams per cubic meter. Some PCBs are considered to be probable human carcinogens, having demonstrated carcinogenic effects in animal tests; chronic exposure to PCBs could cause cancer in some cases.

5.1.2 PROTECTIVE MEASURES

Measures that will be implemented to avoid the risks associated with the chemical hazards include:

- Don appropriate PPE (described in Section 6.0).
- Wash hands and face before eating or drinking.
- Avoid contact with potentially contaminated substances.
- Prevent splashing of contaminated liquids.

5.2 PHYSICAL

The planned activities will involve physical hazards inherent with working outside and in the presence of heavy equipment. Each potential hazard, the associated risk, and protective measures to be implemented to minimize each risk are as described below:

- **Concrete saw cutting.** Risks specific to this activity include noise, eye injury, laceration or dismemberment of body parts, and straining of muscles due to handling of heavy equipment. Concrete saw cutting could also cause exposure to dust/silica if a dry process is used. However, because this work plan specifies a wet cutting process, exposure to dust/silica is not considered a hazard. Precautionary measures to be taken during saw cutting include:
 - The use of machine guarding equipment such as protective covers and shrouds, blade guards, and emergency kill switches that are in working order
 - Protection of any electrical hand tools or devices by a ground fault circuit interrupter (GFCI)
 - Donning appropriate protective equipment, as specified in Section 6.0.
- **Pressure washing:** Hazards specific to this activity include slip, trip, and fall; muscle strain due to handling heavy equipment; and eye injury. Protective measures to be taken during pressure washing include:
 - The use of machine guarding equipment such as protective covers and shrouds, blade guards, and emergency kill switches that are in working order
 - Protection of any electrical hand tools or devices by a GFCI
 - Donning appropriate protective equipment, as specified in Section 6.0.
- **Vehicular Traffic:** The presence of vehicular traffic associated with Boeing's daily work activities at the NBF facility is considered a potential hazard. Site vests worn by each worker and the attentiveness of each worker will be used as protective measures to minimize the risks associated with vehicular traffic.

6.0 PERSONAL SAFETY EQUIPMENT

Personal safety equipment is required within work areas where there is a potential for exposure to hazardous substances and physical hazard. Descriptions of the levels of protection and the required safety equipment for each level are provided in the following sections.

6.1 LEVELS OF PROTECTION

Levels of protection have been defined by the U.S. Environmental Protection Agency (EPA) in the EPA *Standard Operating Guide* (1984):

- Level A requires a fully encapsulating suit and full-face self-contained breathing apparatus (SCBA) with a 5-minute supplied air escape pack for the highest level of respiratory, skin, and eye protection. Level A is not anticipated at NBF and, therefore, is not discussed further.
- Level B requires maximum respiratory protection by the use of supplied air or a positive pressure SCBA. A 5-minute supplied air escape pack is required while in Level B. Dermal protection is selected on the basis of anticipated hazards. Level B is not anticipated at NBF and, therefore, is not discussed further.
- Level C requires an air-purifying respirator that is specific to the contaminants of concern. The degree of dermal protection depends on anticipated hazards.
- Level D is the basic work uniform, modified for CJM removal work at NBF, and as described in Section 6.2.

6.2 REQUIRED EQUIPMENT

The level of protection designated Level D is recommended for all CJM removal activities. However, the PPE required has been modified based on the tasks that are being performed. When saw cutting and pressure washing during the interim action, the following PPE is required:

- One-piece disposable Tyvek coveralls
- Nitrile inner-disposable gloves
- Leather outer gloves when saw cutting; neoprene and/or nitrile outer gloves when performing pressure washing
- Neoprene steel-toed and steel-shank, chemically resistant, impermeable outer boots or disposable boot covers
- Safety glasses (or face shield when performing tasks where liquid splashes or sprays are to be encountered)
- Dust mask (saw cutting activities only)
- Safety vest
- Ear protection when operating noisy equipment.

The minimum PPE to be worn during all other CJM removal activities includes:

- Hardhat (if overhead hazards exist)
- Safety glasses with side shields
- Steel-toed boots
- Ear protection in the vicinity of noisy equipment
- Work gloves and/or chemical-resistant gloves
- Safety vest in the vicinity of high traffic areas.

7.0 EMERGENCY RESPONSE

In the case of any emergency, the procedures described below will be followed.

7.1 NOTIFICATION AND REPORTING

The Site Safety Officer is to be notified immediately. If the situation is life-threatening and notification of the Site Safety Officer would delay emergency response, site personnel may initiate the appropriate emergency contacts prior to notifying the Site Safety Officer. The Site Safety Officer will then initiate contacts as follows:

1. Call Boeing Emergency Dispatch (Table A-1) and provide the following information:
 - Name and location of person reporting
 - Location of accident/incident
 - Name and affiliation of injured party
 - Description of injuries
 - Status of medical aid effort
 - Details of any chemicals involved
 - Summary of the accident, including the suspected cause and the time it occurred
 - Temporary control measures taken to minimize further risk.

Note: This information is not to be released to parties other than the Site Safety Officer, Boeing personnel, contractor personnel, and bona fide emergency response team members.

2. Call the Boeing Project Manager and provide information noted in Item 1 above.
3. The Site Safety Officer will complete a written accident/incident report, using Form A-3, within 24 hours, sending copies to Boeing's Project Manager.

Resources to be used in cases of emergency include:

- List of Emergency Contacts: Table A-1 includes both the appropriate emergency services (top of table) and the appropriate project contacts (bottom of table).
- Nearest Phone: Telephones are located inside buildings. Boeing and Landau Associates' site personnel also possess cellular phones.
- Onsite Emergency Equipment: An industrial first aid kit, a 20-lb type ABC portable fire extinguisher, and an eyewash kit accompany each site vehicle.
- Offsite Emergency Services: Phone numbers for offsite emergency services are listed in Table A-1. Copies of this table must be located in each vehicle.
- Hospital Route: To Harborview Medical Center:
 - North on East Marginal Way South
 - Turn right onto Corson Avenue South

- Turn right onto South Bailey Street
- Turn left to enter the Interstate 5 North ramp (toward Vancouver, B.C.)
- Merge onto I-5 North
- Take Exit 164A (the Dearborn Street/James Street/I-90 East/Madison Street exit)
- Turn right onto James Street
- Turn right onto 9th Avenue. Hospital is at 9th Avenue and Jefferson Street.

7.2 EMERGENCY SITUATIONS AND PROCEDURES

Emergency procedures to be used in emergency situations for injuries and heat and cold stress are described in the following sections.

7.2.1 INJURIES

In emergency situations for injuries that are not life-threatening (e.g., a broken leg), normal decontamination procedures should be followed when possible. However, decontamination procedures may be modified according to the specific circumstances. Outer protective clothing should be removed if doing so would not cause delays or aggravate the injury.

Bodily injuries that occur as a result of an accident during operations at NBF will be handled in the following manner:

- The victim will be administered to by an individual who holds current first aid and/or CPR certification, as necessary
- The local first aid squad/rescue unit and the local hospital will be notified, as appropriate, depending on the nature of the emergency.

7.2.2 HEAT STRESS

Heat stress can occur at any time when impermeable protective clothing is worn. The degree of risk associated with working in these garments is directly related to numerous factors: ambient temperature, length of time in the suits, availability of shade, acclimatization of personnel, adequate fluids intake by workers, and length of rest periods. Workers wearing semipermeable or impermeable encapsulating clothing should have their heart rate (pulse rate) monitored prior to and throughout any work period that includes sustained moderate to heavy work in protective clothing when the temperature in the work area is above approximately 70°F. If such conditions exist, the following procedures will be carried out to reduce heat stress:

- Acclimatization
- Work/rest cycles
- Heat stress monitoring

- Liquids that replace electrolytes/salty foods available during rest
- Use of buddy system.

Each employee should check his/her pulse rate at the beginning of each break period. The pulse rate should be taken at the wrist for 30 seconds, and multiplied by 2. If the pulse rate exceeds 110 beats per minute, the length of the next work period should be reduced by one-third (the rest period need not be lengthened). A pulse rate in excess of 150 beats per minute may indicate heat exhaustion, although this rate will vary among workers. All personnel will know what their baseline pulse rate is before working in elevated temperatures, so as to monitor themselves. Personnel should follow appropriate guidelines if any personnel exhibit these symptoms:

- Heat Rash – Redness of skin. Frequent rest and change of clothing.
- Heat Cramps – Painful muscle spasms in hands, feet, and/or abdomen. Administer lightly-salted water by mouth, unless there are medical restrictions.
- Heat Exhaustion – Clammy, moist, pale skin, along with dizziness, nausea, rapid pulse, fainting. Remove to cooler area and administer fluids.
- Heat Stroke – Hot dry skin; red, spotted, or bluish; high body temperature of 104° F; mental confusion; loss of consciousness; convulsions; or coma. Immediately cool victim by immersion in cool water. Wrap with wet sheet while fanning; sponge with cool liquid while fanning; treat for shock. **DO NOT DELAY TREATMENT. COOL BODY WHILE AWAITING AMBULANCE.**

The Site Safety Officer will be trained in monitoring, treating, and recognizing the signs of heat stress. If heat stress occurs, decontamination should be minimized and treatment begun immediately.

7.2.3 COLD STRESS

If joint removal work is conducted during the winter months, when site personnel may be subject to low temperatures, rain, and winds, proper protective clothing must be worn.

Cold stress can be manifested as both hypothermia and frostbite:

- Hypothermia is a cold-induced decrease in the core body temperature that can increase the safety hazards associated with investigation activities that require maximum attentiveness and manual dexterity. Hypothermia produces shivering, numbness, drowsiness, muscular weakness, and, if severe enough, death.
- Frostbite results from the constriction of blood vessels in the extremities, and decreasing the supply of warming blood to these areas. This drop in blood supply may result in the formation of ice crystals in the tissues, causing tissue damage. The symptoms of frostbite are white or grayish skin, blisters, or numbness.

Site personnel should review the information provided in their first aid training for response to cold stress problems.

7.3 FIRE

Fire extinguishers (ABC-type) will be kept in each site vehicle. In the event of major fires, explosions, or fire/explosion hazard conditions, all personnel will immediately evacuate the area. The Site Safety Officer will evaluate the need for further evacuation and/or emergency services.

7.4 SITE EVALUATION AND EVACUATION

The Site Safety Officer will be responsible for determining if circumstances exist that require further evaluation and/or evacuation. The Site Safety Officer should always assume worst-case conditions until proven otherwise.

8.0 TRAINING

All personnel performing joint material removal tasks will have completed formal health and safety training, which complies with 29 C.F.R 1910.120 (certificates of successful completion of training will be maintained in personnel health and safety files), and will verify on-the-job training for those tasks they are assigned to perform. At least one member of each site team will be trained in CPR and first aid, and have participated in 8-hour supervisory training. All operations will be reviewed prior to performing the actual procedures.

9.0 ROUTINE HEALTH CARE AND MONITORING

All persons working in an exclusion zone must be participating in a medical surveillance program that meets the requirements of WAC 296-62-3050. Current statements of medical program participation must be available, if requested.

10.0 REFERENCES

U.S. Environmental Protection Agency. 1984. *Standard Operating Safety Guides*. Environmental Response Branch, Hazardous Response Support Division, November.

**TABLE A-1
EMERGENCY SERVICES**

Service	Name/Location	Phone Number
Ambulance	---/---	206-655-2222 from Boeing property
Fire	---/---	206-655-2222 from Boeing property
Police	---/---	206-655-2222 from Boeing property
Hospital	Harborview Medical Center 325 Ninth Avenue Seattle, WA 98104	206-744-3000

CONTACT INFORMATION

Boeing Environmental Affairs

Carl Bach
Site Supervisor

206-898-0438 (cell)

Seattle, WA

Boeing Emergency Dispatch

206-655-2222

Landau Associates

Kristy Hendrickson
Project Manager

425-778-0907 (office)
206-910-1378 (cell)

Edmonds, WA

**FORM A-2
MODIFICATION TO HEALTH AND SAFETY PLAN**

DATE ____/____/____

Modification: _____

Reasons for Modification: _____

Site Personnel Briefed:

Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____

Approvals:

Site Safety Officer: _____

Manager: _____

Others: _____

FORM A-3
EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Use additional page if necessary)

Date: _____ Time: _____

Name: _____ Employer: _____

Site Name and Location: _____

Site Weather (clear, rain, snow, etc.): _____

Nature of Illness/Injury: _____

Symptoms: _____

Action Taken: Rest: _____ First Aid: _____ Medical: _____

Transported by: _____

Witnessed by: _____

Hospital's Name: _____

Treatment: _____

Comments: _____

What was the person doing at the time of the accident/incident? _____

Personal Protective Equipment Worn: _____

Cause of Accident/Incident: _____

What immediate action was taken to prevent recurrence? _____

Additional comments

Employee's Signature/Date:

Supervisor's Signature/Date

Site Safety Representative's Signature/Date
